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ABSTRACT

This study provides support for the hypothesis that science process skills instruction and information on Black scientists can alter the belief systems of close-minded individuals. Preservice teachers were assigned to two experimental groups based on their median Rokeach Dogmatism Score, which also served as a pretest. One of the experimental groups was randomly assigned instruction in science process skills, plus information on Black scientists; the other group received instruction in science process skills plus information on various books for elementary children. Upon completion of the experimental instructions, the Rokeach Dogmatism Scale was again administered. Analysis of covariance determined that significant changes occurred in the dogmatism of close-minded subjects after the experimental instructions were completed, with positive difference favoring the group receiving instruction in process skills plus information on famous Black scientists. (Author/CS)

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THE EFFECT OF INFORMATION ABOUT FAMOUS BLACK SCIENTISTS ON THE CLOSED-MINDEDNESS OF PRESERVICE TEACHERS*

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The purpose of this study was to test the contention that information about famous Black scientists can alter the belief systems of closed-minded individuals.

Psychologists and educators have shown a great deal of interest in personality traits and attitude changes during the last two decades. It has been hypothesized that attitude changes are affected by a person's belief system (Rokeach, 1960). Open-minded persons are usually described as being more willing to change and adopt new and innovative ideas, whereas closed-minded persons have been described as exhibiting attitudes which are just the opposite.

Belief systems and attitude changes are important to the science educator, since a great deal of emphasis is on having teachers employ up-to-date teaching strategies and skills, such as science process skills, and also on the development of positive attitudes necessary for working effectively in a variety of learning environments.

The research literature reveals that belief systems are related to effective science teaching. Dick (1967) compared preservice teachers' belief systems with their attitudes toward science teaching and found that open-minded teachers were more favorable toward implementing innovative teaching

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methods than closed-minded teachers. Blankenship and Hoy (1968) found that there is a positive relationship between teachers' open-mindedness and their capacity for independent thought. Campbell (1973) found that open-minded preservice teachers' scores correlated positively with the number of basic science process skills written in their lesson plans.

Implicit in studies reported thus far is the assumption that if the closed-mindedness of teachers can be changed, then this would improve the chances that they will implement desirable learned skills in a variety of school settings. At present, however, there are few empirical studies to describe procedures of how one's closed-mindedness can be altered.

The independent variable in this investigation is information on famous Black scientists, and the dependent variable is closed-mindedness as measured by the Rokeach Dogmatism Scale E (RDSE) (1960).

In this study the following hypothesis was tested:

HO: There is no difference in the post mean scores on the RDSE between persons who received information about famous Black scientists and those who received information on critiques of textbooks, controlling for initial RDSE scores.

METHODOLOGY

Subjects: The Ss for this investigation were preservice teachers (n=46) enrolled in competency-based science methods courses at Florida International University during the 1979 Spring Quarter. All Ss were randomly assigned to two groups based on the procedure described below.

Procedure: All Ss completed the RDSE (pretest) during the first class meeting. Those Ss scoring above the median were considered closed-minded and those scoring below the median were considered open-minded.* Two experimental groups were constructed by obtaining a stratified random sample from the open-and closed-minded Ss. The design for this investigation was the Pretest-Posttest Control Group Design based on the nomenclature proposed by Campbell and Stanley (1969) as represented below:

R O_1 X_1 O_2

R O_3 X_2 O_4

In this design, the symbol R represents Ss who were randomly assigned to one of the two treatment groups; X_1 refers to treatment on information about famous Black scientists; X_2 refers to treatment on critiques of elementary science books found in the Science and Children journals; O_1 and O_3 refer to the first observations (RDSE - Pretest); and O_3 and O_4 refer to the second observations (RDSE - Posttest). In addition to the treatments, both groups completed two self-instructional programs on basic and integrated science process skills. The instructional time to complete the basic science process

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* The assignment of Ss in this investigation differs somewhat from those reported by Rokeach (1960), p. 199 because of the sample size. Representative samples were chosen from a large population, with Ss scoring the highest (n=30) and lowest (n=30) on the RDSE the ones selected.

skills (BSPS) program was approximately 4 hours and to complete the integrated science process skills (ISPS) was 5 to 6 hours. Information on both Black scientists and book critiques took about 15 minutes and was given at the beginning of each class period. This information began with the third class meeting and continued through the end of the study, except that no information was provided on test days.

Experimental treatment began during the third class meeting. The investigation lasted for one quarter, or twelve weeks. A summary of the activities is shown in Table 1.

In addition to the activities stated in Table 1, students were required to select and teach three lessons from commercially produced science project materials and complete enrichment activities, including supplementary readings in science books.

All Ss met at regular time periods for methods instruction (four hours per week) and were given Wednesday of each week to carry out tasks with elementary children in field center schools. All of the science methods classes were taught by the first author. Although students were provided a time completion schedule, they were given the opportunity to hand in work as they completed the tasks throughout the quarter.

The data was analyzed utilizing an analysis of covariance. The rejectance level of significance was .05.

TABLE 1

Instructional Treatment and Administration

Class Meeting	Experimental 1	Experimental 2
1	Rokeach Dogmatism Scale	Same
2	Why Teach Science	Same
	Discussion on Commercial Science Projects	Same
3	Divide Class into two groups	Same
	Begin discussion on Black scientists	Begin discussion on textbook critiques
3-5	One-half of group received instruction in BSPS and the other on ISPS	Same
6	Test on BSPS/ISPS	Same
7-9	Group exchange instructional programs: that is BSPS/ISPS	Same
10	Test on ISPS/BSPS	Same
11	Piaget-Like tasks	Same
12	RDSE - Posttest	Same

Instrumentation: The RDSE is a 40 item Likert-Type measure. A high score on the RDSE indicated that a student was closed-minded, while a low score indicated a student was open-minded. A reliability correlation coefficient using the Kuder-Richardson formula for this scale was computed by these investigators to be .71. Rokeach has reported correlation coefficients ranging from .68 to .85 (Rokeach, 1960).

RESULTS

The means, adjusted means, and standard deviations for the scores on the RDSE for the Experimental 1 and 2 groups are presented in Table II.

TABLE II

Mean Pretest Experimental 1 (Black Scientists) and Experimental 2 (Book Critiques) and Adjusted Mean Criterion

		Pretest		Posttest		
				Unadjusted		Adjusted
Group	N	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$
Experimental 1	24	-16.79	32.30	-33.42	25.71	-30.15
Experimental 2	22	- 8.27	24.93	- 5.41	44.91	- 8.97

To determine if there were a difference in the Ss belief systems, controlling for pretest, an analysis of covariance was done. The adjusted means for the Experimental 1 Ss exceeded ($P < .05$, $F=6.41$, $df_1=1, df_2=43$) that for the Experimental 2 Ss on the posttest as determined by the analysis of covariance presented in Table III.

TABLE III

Analysis of Covariance of Experimental 1 (Black Scientists) and Experimental 2 (Book Critiques)

	GROUPS			
Source	SS	df	MS	F
Regression	23774.92	1	23774.92	30.25**
Between	5037.37	1	5037.37	6.41*
Within	33788.23	43	785.77	

* $P < .05$

** $P < .001$

The results of the data analysis indicate that the belief systems of Ss in Experimental 1 group, or those receiving information about famous Black scientists, were significantly different from Ss receiving information on textbook critiques.

An assumption for analysis of covariance is that the slope of the pretest-posttest regression line is the same for each group. The homogeneity of regression test indicated that the assumption of equal regression slope was tenable ($P < .133$, $F=2.34$, $df_1 = 1$, $df_2 = 42$), thus justifying the use of the RDSE pretest as a covariant.

DISCUSSION

The results clearly support the proposition that close-mindedness can be altered through instruction on famous Black scientists. This finding is quite significant in view of previous research evidence which strongly suggests that open-minded individuals are more accepting to new and innovative ideas than closed-minded individuals (Rokeach, 1960; Dick, 1967; Blankenship and Hoy, 1968; and Campbell, 1973).

The general state of the art in education, especially in science education, is to have the teacher implement the process skills instruction approach as the major component in his teaching practices.

Since it has been shown in this study that belief systems can be altered through information on famous Black scientists, then this implies that, perhaps, as science educators, we ought to give serious consideration to the inclusion of this information as part of our teacher training program. By doing this, in our opinion, two goals would be accomplished: (1) it would improve the closed-mindedness of teachers, thus providing some assurance that they will implement desired skills in classroom settings with elementary school children; and (2) it would provide an informational base for both preservice and inservice teachers on the accomplishments made by Blacks in the scientific areas. It is our belief that if teachers are sensitive to accomplishments made by Blacks in the scientific areas, then they will provide this kind of instruction in their regular planning practices. Research reported by Campbell, et al (1979) indicated that Black elementary school children's achievement and self-concepts were significantly enhanced through instruction on information about famous Black scientists.

It is interesting to note at this point that although more than 85 percent of the Ss in this study were non-Blacks and approximately 15 percent Black, they both expressed surprised reactions when they learned that it was a Black man, for example, who was the first person to perform a successful heart operation and also to learn that the blood bank was made possible because of the research efforts of a Black man.

One might argue that closed-mindedness can be just as effectively altered by providing information on non-Black scientists. Perhaps, this would occur, but it would be less significant in view of the lack of knowledge both Black and non-Black teachers exhibited about the contributions of famous Black scientists. It is also doubtful whether the impact on minority elementary school children, or teachers, could be effectively realized with this approach.

REFERENCES

Blankenship, J., and Hoy, W. An Analysis of the relationship between open - and closed-mindedness for independent thought and action. Journal of Research in Science Teaching, 1968, 5, 69-72.

Campbell, D., and Stanley, J. Experimental and quasi-experimental designs for research. Chicago: Rand McNally, 1969.

Campbell, R. L. The Effects of instruction in the basic science process skills on attitudes, knowledge and lesson planning practices of prospective elementary teachers. Unpublished doctoral dissertation, Indiana University, 1973.

Campbell, R., Murphy, D., and Williams, W. Can information about famous black scientists influence the self-concept and academic achievement of minority school children. Paper read at the National Association for Research in Science Teaching Annual Meeting, Atlanta, Georgia, 1979.

Dick, R. A study of open-minded and closed-minded pre-service elementary education majors being trained in contemporary science methods. Unpublished doctoral dissertation, Oklahoma State University, 1967.

Rokeach, M. The open and closed mind. New York: Basic Books, Inc., 1960.